Fish Health Approval
And Inspection

Introduction

Fish growers (in state and out of state), brokers, resource agencies, or anyone, wishing to import live game fish or their eggs into Utah or to sell live game fish/eggs in the state, must meet specific fish health requirements prior to shipment. This document addresses these requirements. For further information, contact the Utah Department of Agriculture and Food Fish Health Program specified in this document as UDAF (801-538-7029).

The UDAF is responsible for granting health approval to out of state sources and in state (commercial) aquaculture facilities. The UDAF evaluates the sources of fish and facilities requesting fish health approval. Fish health approval refers to a system of procedures and processes, which allows assessment of the fish diseases at a facility or in a fish population and gives statistical assurance that emergency and prohibited pathogens are absent. Fish health approval in most cases applies to the entire facility, not individual lots of fish. When the requirements are met, UDAF grants "fish health approval" status, and fish at the approved facility may be sold in Utah (if the facility is located in Utah) or imported into Utah after obtaining an entry permit from UDAF.

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General Approval Information
Fish health approval is necessary before any species of game fish may be imported into Utah or sold in Utah. Fish may only be imported by current Utah certificates of registration (COR) holders possessing current, valid entry permits. Contact UDAF (801-538-7029) for entry permits.

The UDAF maintains a list of fish health approved facilities. These facilities are both in state (commercial) and out of state fish producers. This list is unpublished, because it changes frequently. Any interested party can obtain information from the current list. The UDAF gives information for all facilities approved for any given species.

Approval of Utah Growers of Salmonids (trout, char, salmon, etc.)
The Utah fish health inspection program is based on nationally and internationally approved inspection methods. These are published in the American Fisheries Society (AFS)/Fish Health Section *Blue Book*[1] 3rd and 4th editions, by the World Organization for Animal Health,[2] and in the Canadian Fish Health Protection Regulations.[3] Procedures must meet criteria of the Utah Aquaculture Act (4-37-101) and the Utah Aquaculture and Aquatic Animal Health Rule (R58-17). Changes in the inspection protocol may occur to satisfy requirements of UDAF and other regulating agencies or as new scientific advances in fish diseases justify.

To detect the presence of certain pathogens, UDAF fish health officials conduct inspections. Overt disease is not necessary to disqualify a facility. All lots of fish at a facility must test negative for pathogens according to the size/age of the fish to be tested (see paragraph "Fish Sample Collection"). Inspectors maintain samples from each lot separately. Random samples of fish are collected live, moribund, or fresh dead. After collection, samples are stored in sealed, aseptic and/or clean containers and kept on ice, but not frozen.

Initial approval occurs when a facility submits paperwork for the first time or after the COR for an approved facility has lapsed, and fish health approval has been cancelled. Initial approval requires two inspections at least four months apart with negative test results. Fish must be on the facility premises at least six months before the first inspection.

Following initial facility approval, the owner is issued a UDAF fish health inspection report, the name of the facility is entered on the Utah Fish Health Approval List, and live fish importation and sales may commence. An entry permit is required for each transport of live fish into Utah. Fish health approval is renewed annually based on results of annual UDAF inspections. Inspections may be more frequent to satisfy requirements of Utah and other states or producers.

Since lab testing takes 2-6 weeks to complete, a two-month grace period is allowed after the inspection. This allows time for the registered owner to continue business while awaiting the completion of lab results.

Approval of Out of State Growers of Salmonids (trout, char, salmon, etc.)
Inspection standards acceptable for importation of salmonids into Utah are based on nationally and internationally approved inspection methods. These are published in the AFS/Fish Health Section *Blue Book*[1] 3rd and 4th editions, by the World Organization for Animal Health,[2] and in the Canadian Fish Health Protection Regulations.[3] Procedures must meet criteria of the Utah Aquaculture Act (4-37-101) and the Utah Aquaculture and Aquatic Animal Health Rule (R58-17). Changes in the inspection protocol may occur to satisfy requirements of UDAF and other regulating agencies or as new scientific advances in fish diseases justify.

Out of state inspections shall be conducted by fish health officials, whose credentials are accepted by UDAF. Usually these officials are certified Fish Health Inspectors or Fish Pathologists by the AFS/Fish Health Section. Inspections shall be conducted to detect the presence of certain pathogens. Overt disease need not be found to disqualify a facility. All lots of fish at a facility must test negative for pathogens according to the size/age of the fish to be tested (see paragraph on "Fish Sample Collection"). Samples from each lot shall be maintained separately. Random samples of fish shall be collected live, moribund, or fresh dead. After collection, samples shall be stored in sealed, aseptic containers and kept on ice, but not frozen.

For initial or first time approval, out of state growers must submit the following to UDAF for review.

a. Inspection reports for the previous two years (minimum). All lots require inspection. For each lot, the report must show species, age, number in lot, number sampled, source of fish (where the fish originated from), and results of testing. This includes any lots of fish that originated from sources outside Utah. The required inspection results for a given lot also include the parents of the lot.
b. Facility disease history reports for five years previous to the application date. This entails a list of all pathogens, regardless of pathogenicity, diagnosed in any fish species at the facility (main station or substation) under approval consideration. The list would include species and age of fish, date, mortality rate, treatment, etc.
c. Five-year disease histories for all stocks imported to the facility under approval consideration. This would include both inspection reports and disease history reports for all stocks imported, dates, species, ages, mortality rates, etc.

Following initial approval, the name of the approved facility is entered on the Utah Fish Health Approval List, and fish importation may commence. Contact UDAF to obtain an entry permit (801-538-7029).

UDAF renews the fish health status for each facility annually to reinstate fish health approval status. The following are required for the annual renewal:

1. Annual inspection results;
2. Disease history for the facility for the previous year, and

3. Disease histories for all stocks imported to the facility for the previous year. Submit this to UDAF Fish Health Program, PO Box 146500, SLC, UT 84114.

Approval of Utah Growers of Non-Salmonids (warm and cool water fish)
The COR holder completes the *Application for Warm Water Species Fish Health Approval (In State)* form and submits it to UDAF, which conducts an inspection. For renewals, the above form and the COR application form are completed simultaneously.

Because standardized inspection protocols for warm and cool water fish diseases have not been developed, the inspection is based on current information of potential diseases that the species in question may be carrying. Inspections may be more frequent to satisfy requirements of other states or producers. Changes in the inspection protocol may occur to satisfy requirements of UDAF and other regulating agencies or as new scientific advances in fish diseases justify.

Inspection requirements:
1. Virology: Target organisms include IPNV and other filterable agents. Two cell lines shall be used. One of the cell lines should be highly sensitive to IPNV. For bass approvals, these include one of BF2 or FHM. In cases of cell toxicity, dilutions are required to eliminate false positives. Blind passage is recommended. Findings of any filterable agent may result in denial of fish health approval.
2. Asian tapeworm (*Bothriocephalus acheilognathi)*: If the species being approved is susceptible to infection by the Asian tapeworm, it will be inspected for the parasite.

Once the facility has successfully passed the inspection, UDAF sends a letter to Utah Division of Wildlife Resources (DWR) seeking species acceptance. Once UDAF grants final approval, UDAF enters the name of the facility on the Utah Fish Health Approval List, and live fish importation or sales may commence.

UDAF renews fish health approval annually based on the results of annual inspections.

For the Utah grower, who needs to augment his fish from stocks outside Utah, refer to the approval instructions listed in the section that follows. An entry permit is required for each transport of fish into Utah. Contact UDAF (801-538-7029) for directions.

Growers should exercise caution when selling or moving live warm or cool water fish. It is unlawful to sell fish infected with prohibited pathogens in Utah. It is unwise to transport sick fish. If signs of disease are present or fish are sick, then shipping them can further stress the fish, worsen their health, and spread disease.

Approval of Out of State Growers of Non Salmonids (warm and cool water fish)
The facility owner completes the *Application for Warm Water Species Fish Health Approval (Importation)* form and submits it to UDAF for review and final disposition. Out-of-state inspections require services of an approved lab, inspector, and/or pathologist. UDAF makes the final decision regarding the acceptability of the lab, inspector, and/or pathologist.

Because standardized inspection protocols for warm water fish diseases have not been developed, inspections are based on current information on potential diseases that the species in question may be carrying. Inspections may be more frequent to satisfy requirements of other states or producers. Changes in the above inspection protocol may be done to satisfy requirements of other states or producers or as new scientific advances in warm or cool water fish diseases justify. In addition, information on the origin of all species at the facility and on their transfer histories is required.

Inspection requirements:

1. Virology: Target organisms include IPNV and other filterable agents. If laboratory cell culture work has been done, the most recent test shall be within the previous 12 months. The inspection report shall include dates tested, numbers, and ages of fish tested, fish species tested, results, name of inspector and laboratory. Two cell lines shall be used. One of the cell lines should be highly sensitive to IPNV. For bass approvals, one of BF2 or FHM should be used. In cases of cell toxicity, dilutions are required to eliminate false positives. Blind passage is recommended. Findings of any filterable agent may result in denial of fish health approval.
2. Asian tapeworm (*Bothriocephalus acheilognathi):* If the species under consideration is susceptible to infection by the Asian tapeworm, attach fish health inspection or testing results for your facilities from where you export fish. The most recent test shall be within the last 12 months. Testing should be done on 60-fish/water source/year. The inspection report shall include dates tested, numbers, and ages of fish tested, fish species tested, results, and name of inspector and laboratory. If the fish are known carriers of the Asian tapeworm, the *Utah Notice of Treatment* must be completed and accompany the importation of the previously approved fish into Utah.

After receiving the inspection report and the completed application form, UDAF makes a decision about granting approval for importation. If approval is granted, the name of the facility is entered on the Utah Fish Health Approval List, and importation or sales of live fish may commence. An entry permit is required for each transport of fish into Utah. Contact UDAF (801-538-7029) for directions.

Once approved for importation into Utah, the facility owner shall provide a current *Health Statement* to UDAF to accompany each entry permit issued by UDAF. An authorized fish pathologist, fish health inspector, or individual approved by UDAF should sign the statement. The statement shall verify that the fish at the facility are healthy at he time of shipment and have

been healthy for the 45 days before shipment. The statement shall address the following:

1. No signs or knowledge of IPN, LMBV, or diseases caused by other filterable agents;
2. No signs of overt hamburger gill disease (PGD), CCV, or ESC of catfish;
3. No record of other diseases in overt or clinical state;
4. No Ich;
5. No Asian tapeworm; otherwise provide a completed Utah *Notice of Treatment or Testing* form;
6. No *Bulbophorus confusus* in catfish.

Following initial approval, UDAF enters the name of the approved facility on the Utah Fish Health Approval List, and fish importation may commence. Contact UDAF to obtain an entry - permit (801-538-7029)

UDAF renews fish health approval annually based o results of annual inspections. Submit inspection reports to UDAF, PO Box 146500, SLC, UT 84114.

General Inspection Information and Dissemination

Definition: Inspection refers to a standardized procedure for detecting specific pathogens in apparently healthy fish. In inspections, far fewer numbers of pathogens are present than in diseased animals. Therefore, techniques must be used which maximize the chances of detecting these small numbers of pathogens. Inspection standards have been traditionally applied to salmonids.

Dissemination of Information: It is not the policy of the UDAF to provide results on inspection reports to requesters other than registered owners either in written format or verbally. This is done to protect the Utah fish producer. If an individual or agency desires a copy or contents of inspection reports, he may obtain them through government record distribution or by contacting the fish producer directly. The UDAF will only send inspection reports after obtaining the approval of the producer. UDAF fish health officials may state if a producer either is or is not on the fish health approved list.

Specific Inspection Requirements

The following inspection requirements apply to inspections conducted by UDAF fish health officials in Utah and inspections conducted by other qualified fish health inspectors out of state.

Only inspectors or pathologists acceptable to UDAF may collect and handle inspection samples. This means the inspectors or pathologists are recognized by fish health professionals as knowledgeable, competent, and of high ethical standards. Generally, these individuals have current Fish Health Inspector or Fish Pathologist certifications declared by the AFS/Fish Health Section. Also acceptable are other officials, such as veterinarians, who are certified or approved

by their respective country of residence and knowledgeable in fish diseases. In Utah, samples may also be collected and handled by individuals, i.e., fish health specialists, under direct supervision of certified professionals.

During inspections, UDAF follows a precise collection order. The tissues requiring the most aseptic collection technique are taken first. Tissues requiring the least care in sampling are collected last. The order of collection is bacteriological sample, BKD sample, viral sample and parasitological sample. The AFS *Bluebook*[1] suggests placing the viral sample before the BKD sample; however, UDAF will often collect pyloric caeca for viral samples. Because the BKD sample can be contaminated from contact with intestinal contents, the BKD tissues are taken before viral samples.

Sample collection is done on a lot basis. *A lot is defined as a group of fish of the same species and age that shares the same water source and is derived from a distinct spawning population or site.*

The number of samples randomly collected from each lot must be tested at a statistically significant level required to detect at least one infected animal in a population with 95% confidence, based on an assumed prevalence level of 5% for a given pathogen. Fewer samples are collected from small lots as follows.

Lot Size	**Sample Size**
50	35
100	45
250	50
500	55
1000	55
1500	55
2000+	60

UDAF gives special consideration to lot sizes when species are valuable, irreplaceable, or listed as threatened and endangered.

Tissues sampled vary depending on the situation. in the case of a brood lot of less than 60 fish, ovarian fluids must be tested from all female salmonids spawned. Spleen and kidney samples

from ripe males may then be taken to complete the sample. In this way, lethal sampling of the entire lot is not required. The sample should include fresh mortalities and moribund fish. Required sample numbers may vary for each state.

Fish samples shall not be processed more than 48 hours after collection. Samples shall be stored and shipped on ice, but not frozen.

Pathogens Inspected

1. Inspections are usually conducted on fish that appear healthy. Because inspections are made for pathogens in the absence of disease, much lower amounts of the pathogen will be present than found in diseased animals. Therefore, according to the *Blue Book,*[1] "sampling and detection techniques must be used which maximize the chances of detecting small numbers of organisms."

2. All lots of salmonids at a facility must test negative for the presence of the following prohibited viruses (INHV, IPNV, and VHSV), and bacterial *Renibacterium salmoninarum* (BKD). If only eggs are to be imported, then we require/conduct inspections of the parents and only for vertically transmitted pathogens. All eggs must be disinfected properly before importation. Salmonids are also inspected for the OMV virus and the parasites PKX and *Ceratomyxa shasta,* if the signs for the respective disease are detected or if fish/eggs of the lot originate from an area endemic for that pathogen. Cyprinids, centrarchids, percids, poecilids and siluroids are tested for the Asian tapeworm.[4,5,6]

3. Some states require salmonid testing for *Aeromonas salmonicida* (furunculosis) and *Yersinia ruckeri* (enteric redmouth). Because these horizontally transmitted pathogens are normally management/stress related and treatable, they are not regulated in Utah. UDAF will conduct necessary sampling for these pathogens at the request of the grower. Examinations shall take place at least one month following antibiotic therapy.

4. Because salmonid pathogens differ in their mode of transmission, samplings may vary as follows:

   a. ***Myxobolus cerebralis*** (causative agent of whirling disease) is most commonly transmitted via water; therefore, 60 fish are inspected from each water source. Only those fish that have been at the site > 6 months are inspected. The most susceptible species of salmonids should be included in the sample. In some cases, inspections of all species of salmonids, regardless of susceptibility, may be required. Most studies suggest that transmission of spores occurs from dead fish; however, the grower should be aware that some researchers have reported transmission of spores from live fish via feces and ruptured gill cysts.

For fish < 12 inches length, sixty whole heads are samples. For larger fish, optimum samples are whole heads; however, partial heads are also acceptable for most state requirements. For example, these are cut horizontally through the mouth to the posterior edge of the operculum, then vertically from the dorsal aspect to meet the horizontal cut. Half of each head may be held back by the processing lab for histology in case confirmation is necessary. Gill arches by themselves are not adequate samples. Fish may be processed in five fish pools using the pepsin-trypsin digest technique. Under certain circumstances, individual fish heads may be digested. Coring and wedging heads are avoided, because the more highly infected cartilage areas may be damaged or not included in the process. A finding of spores in the pepsin-trypsin digest technique is only presumptive evidence of *M. cerebralis.*

Several species of myxosporean parasites infect salmonids. Because these are very similar in morphology and may be confused with *M. cerebralis,* it is necessary to confirm the identity of the parasite if *M. cerebralis* is suspected. Whirling disease is confirmed by verifying the presence of spores in cranial cartilage by histology. For histopathology, target tissues should include the cartilage in the ventral calvarium area and in the semicircular canals, but the target site may vary with species. Although fixed tissues are optimal, frozen tissues are adequate for confirmation and used if they are the only tissues available from the lot in question. Although the *Bluebook* indicates that trophozoites in lesions confirm diagnosis, UDAF considers this a controversial technique and requires the presence of spores in cartilage for confirmation. Numbers of heads collected for histopathology for each water source may be as much as 150, depending on individual state requirements.

b. **Viruses** are transmitted both horizontally and vertically from fish to fish. Therefore, 60 fish are inspected from each lot. In addition to samples of tissues from adults, ovarian fluids from ripe females are collected at spawning time. Ovarian fluids are required from ripe to post-spawning females for IHNV detection. The combined number of tissues and ovarian fluids constitutes one lot. Ovarian fluids and tissues are not mixed. Brood fish of the same stock that are 12+ months of age may be combined in one lot. Since IHNV, IPNV, VHSV, and OMV can be shed in ovarian fluids in infected adults, UDAF considers them in the inspection results as log as pertinent cell lines are used. In addition, IHNV can be detected in tissues of sub-clinically infected fish; therefore, this virus is included in UDAF inspection results when appropriate tissues are sampled and appropriate cell lines are used. Samples may be stored for up to 48 hours before processing on cell lines if held at 4-10 degrees Centigrade and in 7.4-7.8 pH buffered solution. Positive controls must be used with the tests for IHNV and IPNV. The use of PEG overlay in cell culture is acceptable, but not required. Cell monolayers less than 48 hours old or simultaneous seeding techniques are to be used. Blind passage at 14 days is recommended. Subculture of positives to rule out toxicity is required. Confirmation by

viral neutralization test is required.

c.Renibacterium salmoninarum (BKD) is transmitted both horizontally and vertically. Sixty individual fish are inspected for this pathogen from each lot (see lot definition in the AFS *Bluebook,* 4th Edition, page 3) and from each water source containing salmonids. Usually this requires a minimum of 60 fish/lot for non-brood facilities and 60/stock for brood facilities (*a stock is a group of fish regardless of age, but of the same species, from a distinct spawning population (egg source or spawning site), and sharing the same water source).* A full 60-fish/lot sample may be required for brood facilities if ample fish or ovarian fluids are available. To reduce the need for lethal sampling of valuable brood stock, their offspring or pelletized ovarian fluids may satisfy testing requirements. A combination of tissues and ovarian fluids may constitute one lot (tissues and ovarian fluids are not mixed). Only Colorado requires lethal sampling of brood or adults. As a rule, UDAF only inspects trout >4" (10 cm) length, because smaller fish may not have enough kidney tissue for both virus and BKD samples. The direct or indirect fluorescent antibody test (FAT) is used. Laboratories are expected to freeze excess tissue until results of testing are known. If original samples are positive by FAT, then the frozen tissue is to be retested by FAT. If the retest is positive, the lot is considered positive. If the retest is negative, the remaining tissue is cultured on selective kidney disease media for 21 days. If the culture is negative, then the lot is considered negative. If the culture is positive, then the lot is positive for BKD. If original sample tissue is not available, the same lot of fish should be resampled to determine if BKD is present. UDAF may consider the use of membrane filtration FAT to meet the inspection requirement. During sampling, utmost care must be taken not to contaminate the sample with feed or intestinal content, as these can lead to immuno-crossreactivity (false positives) from other bacteria.

d.Aeromonas salmonicida and ***Yersinia ruckeri*** (agents of furunculosis and enteric redmouth) are collected if fish are to be shipped to a state requiring testing and after requested by the grower. For these, sixty (60) fish are collected per station. Appropriate tissues are streaked onto blood agar, tryptic soy agar, or brain heart infusion agar. Plates are inverted and refrigerated during shipment, then incubated at 25 C for 48 h.

e.**Ceratomyxosis** is a disease caused by the myxosporean parasite *Ceratomyxa shasta.* The parasite is found enzootic in areas of Oregon, Washington, Idaho, N. California, British Columbia, and the Yukon River of Alaska. Fish are tested for this pathogen if they originate in these areas.

f. **Proliferative kidney disease** is caused by PKX or a myxosporean parasite. The parasite is enzootic to areas of California, Idaho, Montana, Washington, Alaska and Canada. Fish are tested for this pathogen if they originate in these areas.

g. **Asian tapeworm:** See sections dealing with this pathogen as listed on the UDAF/Fish

Health Program web site (www.ag.state.ut.us/divisns/animind/fishhlth.htm).

Fish Sample Collection

The following tables list tissues sampled and tested for various fish sizes and ages.

Size/Age*	PATHOGEN IHNV	IPNV	VHSV	OMV
AFS Group 1:< 4 cm (1.5") or < 1.2 mo UDAF 1: <5 cm (2") or <1.5 mo	wf minus yolk sac & tail	wf minus yolk sac & tail	wf minus yolk sac & tail	et
AFS Group 2: 4-6 cm (2.3") or 1.2-2.0 mo UDAF 2: 5-9 cm (2-3.5") or 1.5-4 mo	wv/k/g (f, 1, optional)	wv/k (b, optional)	k/s	et
AFS Group 3: >6 cm (2.3") or >2 mo UDAF 3: >9 cm (3.5") or >4 mo	ksg	k/s (f, 1, pc, optional)	k/s (b, optional)	et
AFS Group 4: brood stock UDAF 4: brood stock	k/s/g/of (b, 1, pi, optional)	k/s/of (sf, f, 1, pc, optional)	k/s/of	of/et

Size/Age*	PATHOGEN Rsalmoninarum	Mcerebralis	Cshasta	PKX
afs Group 1: <4 cm (1-5") or <1.2 mo UDAF 1: <5 cm (2") or <1.5 mo	n/a	n/a	pi (scrapings) (k, l, pc & ascites, optional)	n/a
AFS Group 2" 4-6 cm (2.3") or 1.2-2.0 mo UDAF 2' 5-9 cm (2-3.5") or 1.5-4 mo	k	n/a	same as above	n/a
AFS Group 3: >6 cm (2.3") or >2 mo UDAF 3: >9 cm (3.5") or >4 mo	k	whole head	same as above	k/s imprints
AFS Group 4: brood stock UDAF 4: brood >30 cm (12"0	k of, optional	cut head	same as above	ks imprints

Size/Age*	Asian TW	PATHOGEN CCV	HVS
AFS Group 1: < 4 cm (1.5") or < 1.2 mo UDAF 1: <5 c, (2") or < 1.5 mo	ai	v	wf
AFS Group 2: 4-5 cm (2.3") or 1.2-2.0 mo UDAF 2: 5-9 mc (2-3.5") or 1.5-4 mo	ai	k/s	k, st, l intestine

AFS Group 3: >6 cm (2.3") or > 2 mo UDAF 3: >9 cm (3.5") or >4 mo	ai	k/s	k, st, l Intestine
AFS Group 4: brood stock UDAF 4: brood stock	ai	k/s	k, st, l Of, sf, intestine

Abbreviations: *ai,* anterior intestine; *b*, grain; *et*, epithelial tumors; *f,* feces; *g,* gill; *k*, kidney; l, liver; *n/a*, no sample required; *of*, ovarian fluid; *pc,* pyloric caeca; *pi,* posterior intestine; *sf,* seminal fluid, *s*, spleen; *st*, stomach; *wf*, whole fish; *wv*, whole viscera.

- Group refers to A Size Groups 1-4" in the AFS Blue Book.[1] Age is based on assumed growth at 0.022" or 0.056 cm/day at constant 50C water temperature and $C = 4X10^{-7}$ (Piper, pg 62).[4] UDAFA refers to the optimal size/age structure as sampled by UDAF.

Laboratory Requirements

All laboratory testing must be conducted at a recognized or approved facility. UDAF uses the following independent laboraties, thus removing the possibility of bias from the inspection process.

For whirling disease, BKD and other bacterial pathogens of salmonids

Washington Animal Disease Diagnostic Laboratory (WADDL)
(WADDL is an USDA approved facility considered competent to conduct diagnostic procedures for aquatic animal health)
C/O Dr. Danielle Stanek
Bustad Hall, Room 155N
Pullman, WA 99164
Phone: 509-335-9696

For viral pathogens of salmonids (IHNV, OPNV, VHSV):

Bozeman Fish Health Laboratory
C/o Crystal Hudson, Lab Manager
920 Technology Blvd
Bozeman, MT 59715
Phone: 406-582-8656

Additional work on the above pathogens and on other prohibited and non-prohibited pathogens can be done by other laboratories as required. For example, the following laboratory is capable of bacterial and histopathological testing:

Smart Veterinary Diagnostic Laboratory
Utah State University
950 E. 1400 N.
Logan, UT 84322
Phone: 435-797-1895

The following are examples of costs charged by WADDL effective December 6, 2000. All

Charges are born by the fish farmer.

Virology:

$360 / 60 fish or $15 x 12 pools x 2 cell lines (work is presently done at no charge by USFWS)

Bacteriology:

Aerobic cultures for furunculosis and redmouth: $108 60 fish
BKD DFAT (kidney and ovarian pellet): $150 / 60 fish ($2.50/ fish)
BKD ELISA: $270 (individual testing) or $54 (12 x 5 fish pools at $4.50)

Parasitology (Whirling Disease)

Digest: $63 (12 X 5 fish pools @ 5.25) or $315 (individual heads)
Histology: $7.50 / section or slide
PCR: Currently no charge

Additional WADDL charges:

Above charges include a 50% out-of-state surcharge
A $10 accession fee is charged for each case or inspection.

Transportation: FedEx charges approximately $65 / inspection for shipping coolers. At least two coolers are used per inspection.

References

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2 Diagnostic Manual for Aquatic Animal Diseases. 1995. 1st ed., Office International des Epizooties, World Organisation for Animal Health. ISBN 92-9044-383-9.

3 Department of Fisheries and Oceans. 1984. Fish Health Protection Regulations: manual of compliance. Fish. Mar. Serv. Misc. Spec. Publ. 31 (Revised): 43 p.

4 Piper, R. G., et al. 1982. *Fish Hatchery Management.* US Department of Interior, Fish & Wildl. Serv., Wash., D. C. 517 p.

5 State of Utah, Department of Agriculture and Food. 1997. Policy on shipment requirements of triploid grass carp into Utah. Michael R. Marshall DVM, State Veterinarian.

6 State of Utah, Department of Agriculture and Food. 1996. "Asian tapeworm biodata sheet." A. Kent Hauck, author.

10-94 initial (RL)
3/98 revised (KH)
11/00 revised (KH)
3/01 revised (KH)
9/01 revised (KH)